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(54) External storage device and external storage device unit and method of producing external storage device.

(57) An external storage device comprises an external storage device main formed into a plate shape or a card shape through coating and sealing a storage medium series element containing at least a non-volatile memory device (2) by using insulator (3), and external connection terminals (5b) which are

connected to input/output terminals of the storage medium series element coated and incorporated by the insulator (3) and which are led and exposed in a concaved or plane shape (5a) on a peripheral surface of the external storage device main.

FIG. 2

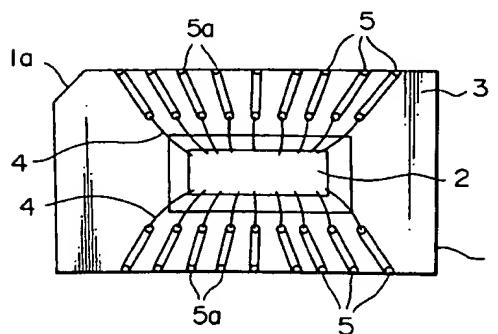
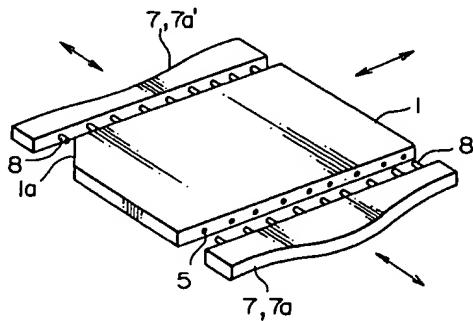


FIG. 5



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The invention relates to external storage devices capable of recording and saving various data, a method of producing the external storage devices, and external storage device unit. More specifically, the invention relates to an external storage device exchangeably used for storage equipment and devices as an external storage medium, and a method of readily producing the external storage device, and an effective utilization of the external storage device.

Storage devices or memory elements, which are capable of recording and saving various data, have been utilized in two systems, namely, one is incorporated and fixed within storage equipment or devices, and the other is releasably or exchangeably incorporated in the storage equipment or devices. For the external storage devices which can optionally be attached or detached or freely removed in the storage equipment or devices, for example, floppy disk devices can be attached and detached by one touch operation. Therefore, the floppy disks being the recording mediums can separately be used depending on purpose and object to record and save the data, whereby easier data reduction can advantageously be obtained.

However, a problem arises in the floppy disks described, where the data occasionally disappears on recording or saving the data to produce less reliability in addition to slower access time. When producing the smaller sized floppy disks in response to a miniaturization policy, a storing area of the storage medium is correspondingly smaller to reduce storage capacity, this thus limits practical use thereof.

On the other hand, semiconductor memory devices used as an external storage device such as IC memory cards can largely solve the drawbacks in the floppy disks, where the IC memory cards generally exhibit graded reliability of recording and saving the data and relatively rapid access time.

The IC memory cards comprise, a functional circuit in which circuit components containing the semiconductor memory devices or elements are mounted on substrates, a resin casing attached therewith the functional circuit as an inside attachment, a cover for coating and sealing both opening surfaces of the resin casing, and external connection terminals such as two piece connectors which are attached on one edge of the resin casing and electrically connect the functional circuit and the storage equipment / device. However, the IC memory cards are assembled with a large amount of components and parts, where a relatively complicated structure is required with limitation to a thickness of the IC memory card. Further, disadvantages arise because of lower cost performance or production yields on mass production in addition to the less releasability for the storage

equipment / devices or fluctuated releasability on function.

An object of the invention is to provide an external storage device formed by simplified process.

Another object of the invention is to provide an external storage device having a high releasability with a high reliable function as an external storage medium.

Further another object of the invention is to provide a method of producing a high reliable external storage device with graded production yields.

Still another object of the invention is to provide an external storage device unit formed by simplified process.

Still further another object of the invention is to provide an external storage device unit having a high releasability with a reliable superior function as an external storage medium.

An external storage device according to the present invention is characterized by comprising,

an external storage device main molded into a plate shape or a card shape through coating and sealing a storage medium series element containing at least a non-volatile semiconductor memory device by using insulator, and

external connection terminals which are connected to input / output terminals of the storage medium series element coated and incorporated by the insulator and which are led and exposed in a concaved or plane manner on a peripheral surface of the external storage device main.

An external storage device unit according to the invention is characterized by comprising:

an external storage device main formed into a plate shape through unitarily coating and sealing the storage medium series element containing at least a non-volatile semiconductor memory device by insulator, and an external storage device having external connection terminals connected to the input / output terminals of the storage medium series element coated and incorporated unitarily by the insulator and led and exposed in concaved manner on a peripheral surface of the external storage device main; and

an external storage device unit including, an engaging section contacted and engaged with a concaved surface led and exposed of at least the external connection terminals of the external storage device, and a connection section having electric contacts which are arranged on a mated contact surface of the engaging section and which are resiliently connected and disconnected from the external connection terminals depending on engaging, attaching and detaching of the external storage device for the engaging section.

Alternatively, an external storage device unit according to the invention including:

an external storage device formed of, an external storage device main molded into a plate shape through unitarily coating and sealing a external medium series element containing at least a non-volatile semiconductor memory device by an insulator, and external connection terminals which are connected to input / output terminals of the storage medium series element coated and incorporated by the insulator and which are led and exposed on a peripheral surface of the external storage device main; and

an external storage device unit main including an engaging section engaged and contacted with a surface led and exposed of at least the external connection terminals of the external storage device, a connection section having electric contacts which are arranged on a mated contact surface of the engaging section and which are resiliently connected or disconnect from the external connection terminals depending on engaging, attaching, or detaching of the external storage device to the engaging section, and a circuit having a control circuit and an interface circuit of the external storage device to be engaged, attached and detached. Here, the external storage device unit main may preferable be formed into a card shape.

A method of producing an external storage device according to the invention is characterized by comprising the steps of: process in which an external medium series element containing at least a non-volatile semiconductor memory device electrically connected with concaved type external connection terminals led outside is arranged in a splitting and assembling type mold provided on its inside walls with protruded shaped terminal protrusions respectively in corresponding to the external connection terminals led outside in way that the external connection terminals and the protruded shaped terminal protrusions opposing each other are registered;

process in which sealing resin is injected into mold arranged and registered of the storage medium series element and both the storage medium series element and the concaved type external connection terminals led outside are coated and sealed unitarily by insulative resin to be formed into a plate shape; and

process in which after molding by the mold, mold pieces of splitting and assembling type are allowed to separate from a plate shaped mold state.

The present invention has cleverly been conceived in that a semiconductor memory device or element is mounted on the conventional substrate, on the other hand, the invention has been achieved in view of the fact that, when a NAND type flash

memory device or element (NAND type flash E²ROM) comes to have a higher integration than DRAM (dynamic random access memory) with a capacity of 16 M-bits per chip, it can correspond to 2 M-bytes of floppy disk. In the structure of the external storage device with a plate shape or a card shape according to the invention, a part or entire of the control circuit components such as semiconductor elements forming a control function in addition to the non-volatile semiconductor memory device exhibiting a memory function, are incorporated into the plate shaped or card type external storage device to produce a build-in type.

In the external storage device according to the invention, first, a memory capacity of an extent of 16 M-bits per chip can be obtained because of a high integration, thereby the non-volatile semiconductor memory device is used as a main memory without requiring a power supply for maintaining the storage. Secondly, the main memory is made into unitary forms, the plate shape or the card type by insulative resin etc. This mold type readily provides easier handling, simplified structure in a thin shape, and resulting in lower cost. In addition, the external connection terminals provided in concaved or flat shapes enable the mold structure of the external storage device to maintain and exhibit higher releasability for the storage equipment / device and to raise a reliability of electrical connection or disconnection due to attaching or detaching operation.

Fig. 1 is a perspective view showing essentials of an example of an external storage device according to the invention;

Fig. 2 is a perspective line plan view showing essentials of an example of an external storage device according to the invention;

Fig. 3 is a schematic sectional view showing essentials of a preferred embodiment in producing an external storage device according to the invention;

Fig. 4 is a schematic sectional view showing essentials of another preferred embodiment in producing an external storage device according to the invention;

Fig. 5 is a perspective view showing a broken down example of an outline of an external storage device unit according to the invention;

Fig. 6 is a perspective view showing a broken down example of essentials of an external storage device unit according to the invention;

Fig. 7 is a perspective view showing a broken down example of essentials of another external storage device unit according to the invention;

Fig. 8 is a perspective view showing an example of a different structure of an external storage device unit according to the invention; and

Fig. 9 is a perspective view showing an example of a further another structure of an external storage device unit according to the invention.

Embodiment 1

Fig. 1 is a perspective illustration of outline of an example of an external storage device according to the invention, and Fig. 2 is a perspective line plan view of an outline of an example of an external storage device according to the intention. In this embodiment, an external storage device 1 is configured in that a NAND type flash memory device 2 is made up on a frame substrate by a wire bonding method to produce a main body thereof sized of length 40 mm and width about 30 mm. The external storage device main is formed into a thin plate shape coated and mold sealed by generally used semiconductor element molding resin such as epoxy based resin or the like. A NAND type flash memory device 2 may be bonded by the TAB (Tape Automated Bonding) system as another system. In this embodiment, on input / output portions of the NAND type flash memory device 2, recessed external connection terminals 5 for electrically connecting by a wire bonding 4 is led and exposed, in a manner of slightly forming recessed surfaces 5a, on end surfaces of opposing edges in a thin plate shape formed by coated and sealed.

In a method of producing the external storage device, Figs. 3 and 4 are sectional views schematically showing a preferred embodiment of a method of producing the external storage device. First, the control proceeds to preparation for the NAND type flash memory device 2 provided with the required external connection terminals 5. An example of such NAND type flash memory device 2 to be prepared is of a NAND type and is assembled in that the recessed shaped external connection terminals 5 is electrically connected and led outside by the wire bonding system. The NAND type flash memory device 2 is attached on a metallic frame (not shown) and may preferably be fixed tentatively with a lead 5b which is led outside. On the other hand, the control proceeds to preparation for a disassemble type mold provided on its predetermined inside-walls with a protruded terminal shaped protrusion 6a mated with a recessed surface 5a of each recessed shaped external connection terminal 5 which is led outside, with respect to the NAND type flash memory device 2. The mold 6 is formed into the disassemble type which includes a side wall 6b formed by combining squared side-walls, a bottom wall 6c engaging and sealing squared top and bottom openings formed from the side walls 6b, and a top wall 6d. A pair of side walls 6b opposing each other from among the side walls 6b are arranged with a group of terminal

shaped protrusions 6a opposing each other and corresponding to the recessed surfaces 5a of the external connection terminals 5 of the NAND type flash memory device 2.

5 The disassemble type mold 6 registers, engages, and arranges the external connection terminals 5 of the NAND type flash memory device 2 with the corresponding terminal shaped protrusions 6a of the mold 6. Then if required, the NAND type flash memory device 2 is floated and positioned through supporting pieces (not shown) for the bottom walls 6c of the mold 6. A concrete example thereof includes that both of a frame section for loading the NAND type flash memory device 2 and the external connection terminals 5 are supported on the mold 6 by using the other thin frame bars. In this way, after positioning and arranging the NAND type flash memory device 2 within the mold 6, the control proceeds to inject sealing resin 3 such as epoxy resin, coating and sealing the NAND type flash memory device 2 together with the recessed shaped external connection terminals 5 in unitary shape by insulative resin 3, and forming into a plate shape. Thereafter, the walls or mold pieces 6b, 6c, and 6d of the assembled and formed mold 6 are separated each other from the plate shaped mold to produce the external storage device as shown in Figs. 1 and 2.

30 In Figs. 1 and 2, numeral 1a depicts direction of the external storage device 1, showing the mechanical attaching and connection for the storage equipment / device main and a mark for preventing or avoiding erroneous attaching. The mark 1a showing directionality is not limited to a corner section or one corner, but it may preferably be set to simultaneously use a guide function in detachable structure of the equipment / devices main. A connection for the external connection terminals 5 of the external storage device 1 may preferable be non-contact connection systems such as radio waves or lights in addition to mechanical connections.

Embodiment 2

45 Fig. 5 to 7 are perspective views showing outline of structures together with operation modes of an external storage device unit according to the invention. In this example, the external storage device 1 formed as described in the embodiment 1 is in condition of one-side constituent element. The storage medium series element containing at least the non-volatile semiconductor memory chip 2 is coated and sealed by the insulator 3 such as epoxy resin, to be connected with the input / output terminals of both the card shape molded external storage device main and the storage medium series element coated and incorporated by the insula-

tor 3, and to produce the external storage device 1 having the external connection terminals 5 led and exposed in manner of a concaved surface on a periphery end surface of the external storage device main, where such external storage device 1 is premised in this embodiment. As shown in Fig. 5, when inserting or extracting the external storage device 1 in or from the engage type unit 7 of the storage equipment / device main by one touch operation, then depending on such insertion or extraction, the external connection terminal 5 led and exposed on opposing edges is resiliently connected to or disconnected from an electric contact 8 arranged on an engaging section of the engaging unit 7.

Fig. 6 shows in detail a structural example of the engaging unit 7, where opposing surfaces of a pair of supporters 7a and 7a', which are arranged opposingly each other, are engaged with end surfaces led from the external connection terminals 5 of the external storage device 1 to produce a slidable form. The electric contacts 8 corresponding to the external connection terminals 5 of the external storage device 1 are electrically insulatively arranged on a slidably formed region on the opposing surfaces of the supporters 7a and 7a'. It is of course that these electric contacts 8 are electrically connected to the main body-side of the storage equipment / device and form the necessary electric circuit.

Numerical 7b depicts a slide stop member of the external storage device 1 for sliding the opposing surfaces of the pair of supporters 7a and 7a'. When the external storage device 1 is inserted and tip end thereof is made in contact with the slide stop member 7b, pin type springs 7c and 7c' are rotated in a reverse direction by pressure due to such contact. By the rotation of the pin type springs 7c and 7c', the electric contacts 8 arranged on the opposing surfaces of the supporters 7a and 7a' are made contact in corresponding to the external connection terminals 5 of thus inserted external storage device 1 to achieve necessary electrical connection. Here, an automatic fixing and setting are completed by inserting the external storage device 1 into the engaging unit 7 to attach it on the predetermined position. Depressing the push button (not shown) arranged on a main body of the unit, which provides release of a fixed engaging piece (not shown) and extraction of the external storage device 1. On releasing the fixed engaging piece, the external storage device 1 is automatically extracted by the reverse rotation of the pin type springs 7c and 7c' and the contacts of the external connection terminals 5 and the electric contacts 8 are released.

According to the invention, the engaging unit 7 is formed as developmentally shown in Fig. 7,

where the pair of supporters 7a and 7a' may preferable be arranged movable in the opposing direction through the resilient type spring 7d by a pair of cylinders 7e and 7e' respectively. Even in this structure, the electric contacts 8, which correspond to the external connection terminals 5 led and exposed on opposing end surfaces of the external storage device 1, are electrically insulated with each other and arranged on the opposing surfaces of the supporters 7a and 7a'. Of course, these electric contacts 8 are electrically connected to the storage equipment / device main body side and forms the necessary electric circuit. Numerical 7b' depicts an insertion stop member when the external storage device 1 is inserted. In case where the external storage device 1 is inserted to allow the contact of the external storage device 1 to be in contact with the insertion stop member 7b', pressure of such contact rotates the resilient type springs 7c and 7c' reverse to an energizing direction, such rotation forwards opposingly the supporters 7a and 7a' to press and contact the electric contacts 8 in corresponding to the external connection terminals 5 of thus inserted external storage device 1 to achieve the required electric connection. On the other hand, by extracting the external storage device 1, the pin type springs 7c and 7c' are reversely rotated, and it is correspondingly pushed out. As is the case shown in Fig. 6, the external storage device 1 is inserted into the engaging unit 7 and attached on the predetermined position, then an automatic fixed setting is performed. On releasing the fixed setting, it is automatically pushed out by the reverse rotation of the pin type springs 7c and 7c', and the contacts of both the external connection terminals 5 and the electric contacts 8 are released.

Embodiment 3

Figs. 8 and 9 are perspective views showing other different examples in external storage device units according to the invention respectively. In the drawings, the external storage device 1 constructed as follows is in a one-side constituent element. The storage medium series element containing at least the non-volatile semiconductor memory chip 2 is coated and sealed by the insulator 3, to be connected with input / output terminals of both the external storage device main formed in a card shape and the storage medium series element incorporated with coating of the insulator 3, and to produce the external storage device 1 having the external connection terminals 5 led and exposed in a manner of a concaved or plane shape on the peripheral end surface or the main surface of the external storage device main, where such external storage device 1 is premised on this embodiment.

The external storage device 1, as shown in Figs. 8 and 9, can optionally be attached or detached on an external storage device unit main 9 provided with a region or window 9a capable of attaching and detaching the external storage device 1. In other words, the external storage device 1 is constructed in that the external storage device unit main 9 including a control device for the external storage device 1 to be engaged and attached is combined with a connection section formed of the electric contacts 8 resiliently connecting or disconnecting on the external connection terminals 5 depending on attaching or detaching of the external storage device 1 to the region 9a (that is a window and forms an engaging / attaching section) detachable for the external storage device 1. This functions that, as in the other embodiments described, the external storage device 1 is engaged, attached and detached by one touch operation to the engaging / attaching section or region 9a of the external storage device unit main 9 to produce the required functions such as recording etc.

In the structure in Fig. 8, the electric contacts 8 corresponding to the external connection terminals 5 of the external storage device 1 are resiliently provided on the engaging / attaching section 9a of the external storage device unit main 9. On engaging, attaching and setting the external storage device 1, a pressure force thereof allows the electric contacts 8 to resiliently contact with the external connection terminals 5 led and exposed in a plane manner on the main surface (backside surface) of the external storage device 1, and such re-added pressure resets the external storage device 1, simultaneously the electric contacts 8 is resiliently detached from the external connection terminals 5.

In Fig. 9, when the external storage device 1 is engaged, attached, and set on the engaging / attaching section 9a of the external storage device unit main 9, the external connection terminals 5, which are placed on the end surface in the attaching or inserting direction, resiliently contacts with the electric contacts 8 arranged on a contact surface of the engaging / attaching section 9a. On resetting to engage or attach the external storage device 1, engaging or hooking is released and allows the electric contacts 8 to detach from the external connection terminals 5, where, if the external storage device unit main is formed into a card shape, then preferably, the external storage device unit is easy to carry as a set. The conventional card type external storage device so called IC memory card, functions as one IC memory card such that, pin connections are loaded in accordance with JEIDA (Japanese Electric Industry Development Association) or PCMCIA, or the other semiconductor devices such as interface circuits or semiconductor memory control circuits or switching

circuits are loaded on the substrate. To the contrary, the present invention features that only the semiconductor memory is optionally separated and used, this therefore provides a great advantage.

It is understood that the invention is not limited to the embodiments as described above and the foregoing and various changes are taken therein without departing from the subject matter of the invention.

As hereinbefore fully described, in the external storage device and the external storage device unit according to the invention, various advantages are provided as listed below. For the external storage device, a high integration is provided, where the non-volatile semiconductor memory device having a larger memory capacity even in one compact chip is used as a main memory, which is molded unitarily into a card shape by insulative resin etc. Such use of the unitary mold type and the non-volatile semiconductor memory device readily provides optional detaching, easier carrying, easier handling, and thin and compact structure, and thus resulting in lower cost performance. In the unitary form thereof, since the external connection terminals are made into a concaved surface or a flat surface without protruding from the coated or sealed resin layer surface, an upgraded slidability is obtained, this eliminates damage and erroneous connection of the external connection terminals.

The external storage device unit also exhibits the graded releasability and improved reliability in function. In particular, various advantages in practical use of the external storage device unit include optional detaching of the external storage device, easier carrying without possibility of damaging from the outside, and a larger recording / saving capacity of the data even in a compact size.

Claims

1. An external storage device comprising:
an external storage device main in which a storage medium series element containing at least a non-volatile semiconductor memory device is coated, sealed by an insulator and molded unitarily into a plate shape; and

external connection terminals which are connected to input / output terminals of the storage medium series element coated and incorporated by the insulator and which are led and exposed in a concaved or plane manner on a peripheral surface of the external storage device main.

2. An external storage device as claimed in claim 1, wherein the non-volatile semiconductor memory device is a NAND type flash memory device.

3. An external storage device as claimed in claim 1, wherein the insulator for unitarily coating and sealing the storage medium series element is an epoxy resin.

4. An external storage device as claimed in claim 1, wherein the external connection terminals are led and exposed in a concaved or plane manner on a side surface of the external storage device main.

5. An external storage device as claimed in claim 1, wherein the external connection terminals are led and exposed in a concaved or plane manner on one main surface of the external storage device main.

6. An external storage device unit characterized by comprising:

an external storage device including an external storage device main in which a storage medium series element containing at least a non-volatile semiconductor memory device is coated, sealed by an insulator and molded unitarily into a plate shape and external connection terminals which are connected to input / output terminals of the storage medium series element coated and incorporated by the insulator and which are led and exposed in a concaved or plane manner on a peripheral surface of the external storage device main; and

a connection section including an engaging section mated and contacted with a surface led and exposed of at least the external connection terminals of the external storage device, and electric contacts which are arranged on a mated contact surface of the engaging section and which are resiliently connected to or disconnected from the external connection terminals depending on engaging, attaching or detaching of the external storage device to the engaging section.

7. An external storage device unit as claimed in claim 6, wherein the non-volatile semiconductor memory device of the external storage device is a NAND type flash memory device.

8. An external storage device unit as claimed in claim 6, wherein the insulator for unitarily coating and sealing the storage medium series element of the external storage device is an epoxy resin.

9. An external storage device unit as claimed in claim 6, wherein the external connection terminals led and exposed in a concaved or plane manner on a side surface of the external storage device main are electrically connected to the electric contacts resiliently provided on a side connection section.

10. An external storage device unit as claimed in claim 6, wherein the external connection terminals led and exposed in a concaved or plane manner on one main surface of the external storage device main are electrically connected to the electric contacts resiliently provided on a top or bottom connection section.

11. An external storage device unit characterized by comprising:

an external storage device including an external storage device main in which a storage medium series element containing at least a non-volatile semiconductor memory device is coated, sealed by an insulator and molded unitarily into a plate shape and external connection terminals which are connected to input / output terminals of the storage medium series element coated and incorporated by the insulator and which are led and exposed in a concaved or plane manner on a peripheral surface of the external storage device main;

a connection section including an engaging section mated and contacted with a surface led and exposed of at least the external connection terminals of the external storage device, and electric contacts which are arranged on a mated contact surface of the engaging section and which are resiliently connected to or disconnected from the external connection terminals depending on engaging, attaching or detaching of the external storage device to the engaging section, and a circuit having a memory control circuit, an interface circuit and a switching circuit of the external storage device to be engaged, attached and detached.

12. An external storage device unit as claimed in claim 11, wherein the non-volatile semiconductor memory device of the external storage device is a NAND type flash memory device.

13. An external storage device unit as claimed in claim 11, wherein the insulator for unitarily coating and sealing the storage medium series element of the external storage device is an epoxy resin.

14. An external storage device unit as claimed in claim 11, wherein the external connection terminals led and exposed in a concaved or plane manner on a side surface of the external storage device main are electrically connected to the electric contacts resiliently provided on a side connection section.

storage device main are electrically connected to the electric contacts resiliently provided on a side connection section.

15. An external storage device unit as claimed in claim 11, wherein the external connection terminals led and exposed in a concaved or plane manner on one main surface of the external storage device main are electrically connected to the electric contacts resiliently provided on a top or bottom surface of the connection section. 5

16. An external storage device unit as claimed in claim 11, wherein the external storage device unit main is formed into a card shape. 10

17. A method of producing an external storage device of a plate shape by coating and sealing using resin, characterized by comprising the steps of: 15

process in which an external medium series element containing at least a non-volatile semiconductor memory device electrically connected with concaved type external connection terminals led outside is arranged in a splitting and assembling type mold provided on its inside walls with protruded shaped terminal protrusions corresponding to the external connection terminals led outside in way that the external connection terminals and the protruded shaped terminal protrusions opposing each other are registered; 20

process in which sealing resin is injected into a mold arranged and positioned of the storage medium series element and the storage medium series element and the concaved type external connections terminals led outside are coated and sealed unitarily by an insulative resin to be molded into a plate shape; and 25

process in which, after molding by the mold, mold pieces of splitting and assembling type are allowed to separate from a plate shaped mold state. 30

18. A method of producing an external storage device as claimed in claim 17, wherein non-volatile memory device of the external storage device is a NAND type flash memory device. 35

19. A method of producing an external storage device as claimed in claim 17, wherein the insulator for unitarily coating and sealing the storage medium series element of the external storage device is epoxy resin. 40

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FIG. 1

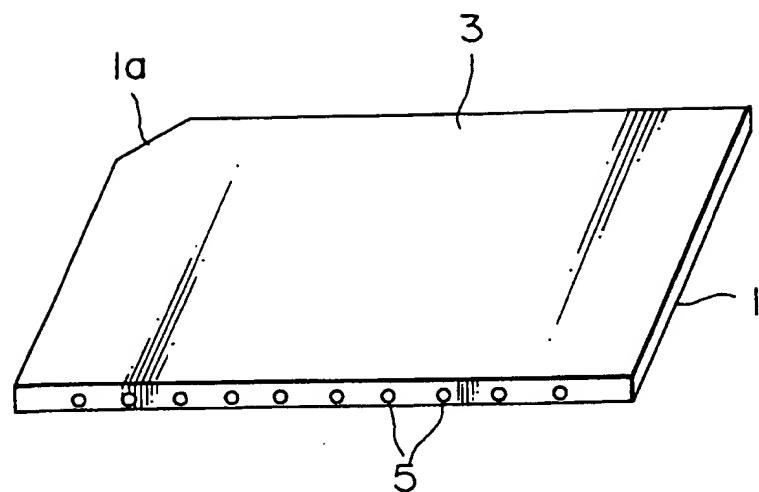


FIG. 2

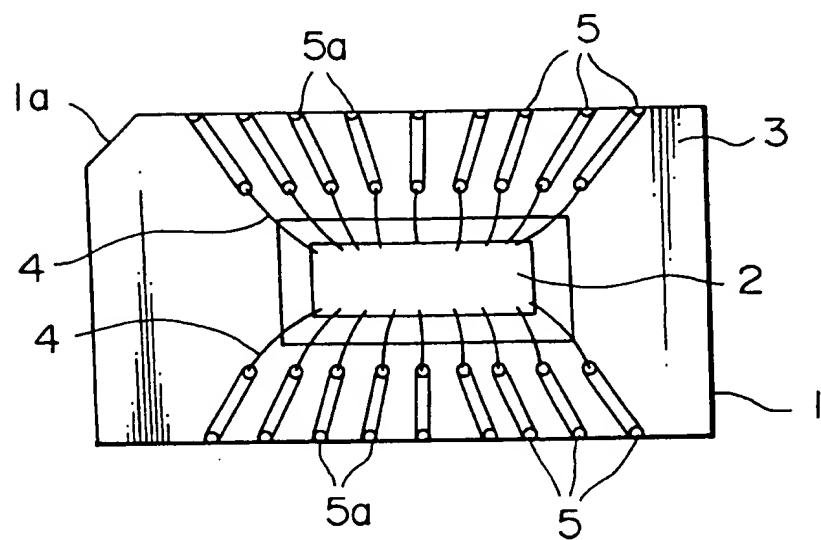


FIG. 3

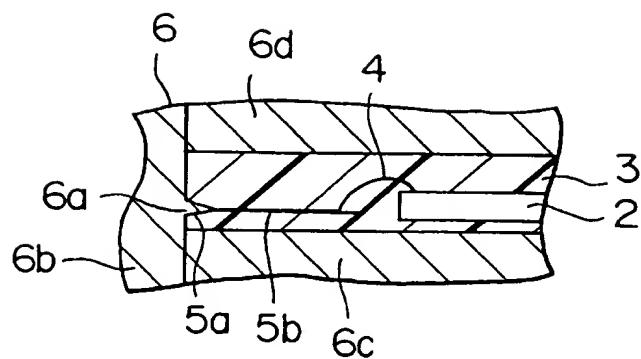


FIG. 4

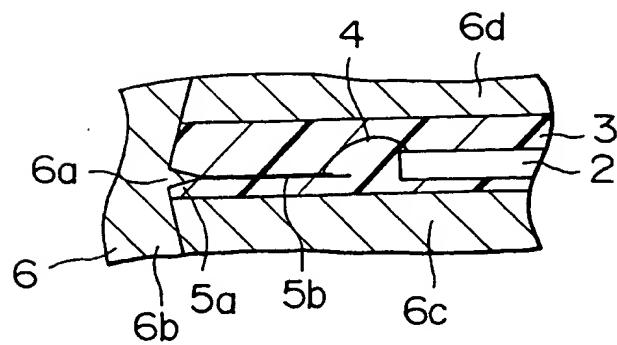


FIG. 5

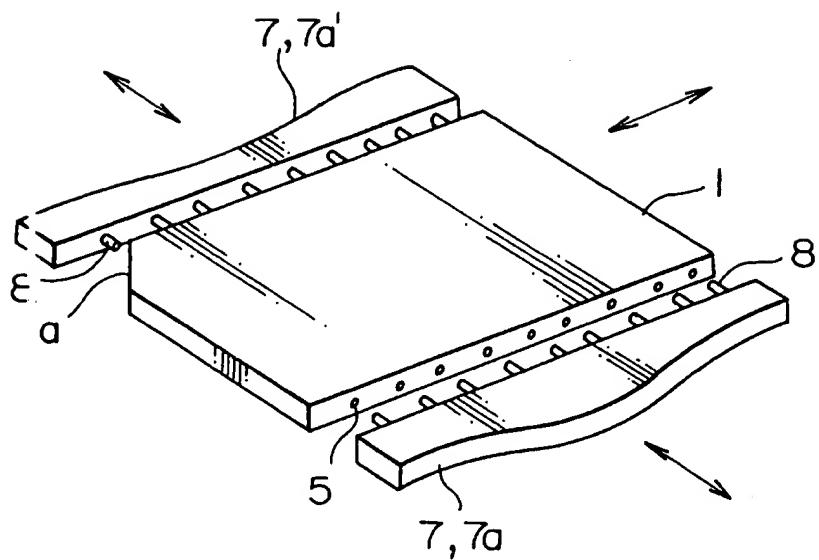


FIG. 6

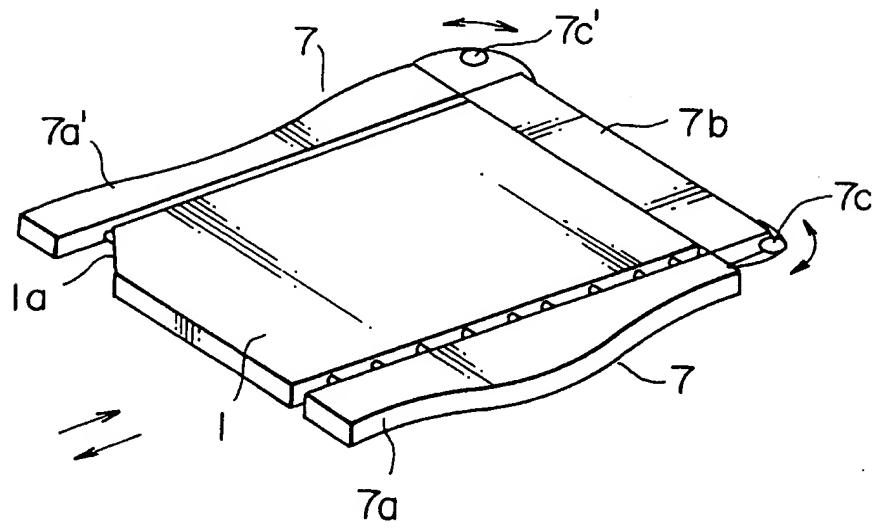


FIG. 7

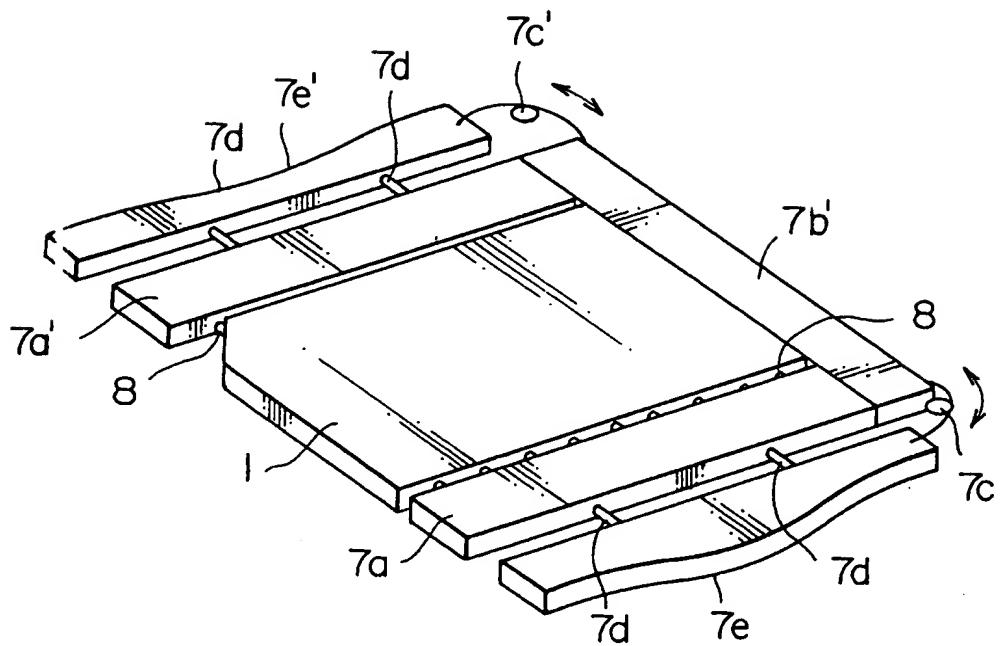


FIG. 8

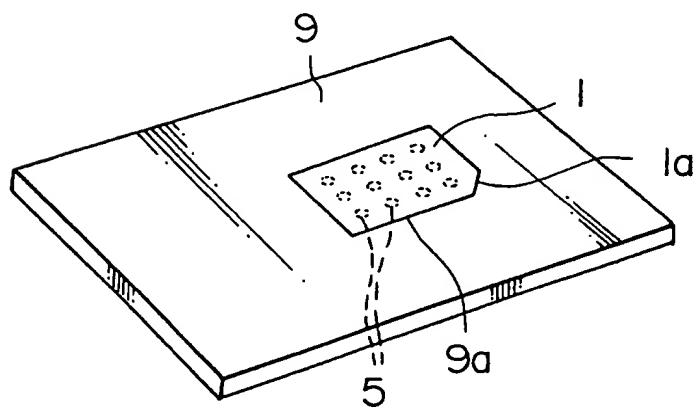
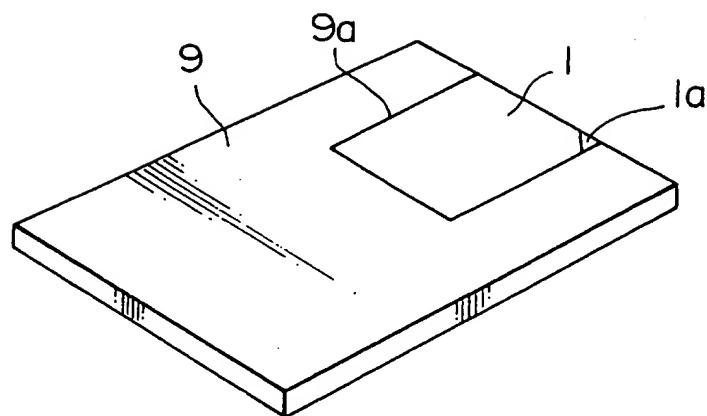


FIG. 9





European Patent
Office

EUROPEAN SEARCH REPORT

Application Number
EP 94 30 1681

DOCUMENTS CONSIDERED TO BE RELEVANT									
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.5)						
X	PATENT ABSTRACTS OF JAPAN vol. 014, no. 166 (E-0911) 30 March 1990 & JP-A-02 022 849 (NEC CORP) 25 January 1990 * abstract * * figures 3,4 *	1-9	G06K19/077 G06K7/06 G11C5/00 H01L21/56 H01L23/31						
A	---	11,17							
A	FR-A-2 359 464 (MAGNETDRUCK, STEENKEN & CO) * the whole document *	1-9							
P,A	PATENT ABSTRACTS OF JAPAN vol. 017, no. 599 (E-1455) 2 November 1993 & JP-A-05 183 094 (NEC IC MICROCOMPUT SYST LTD) 23 July 1993 * abstract *	1,6,17							
A	EP-A-0 338 080 (FANUC LTD) * the whole document *	1,6							
	-----		TECHNICAL FIELDS SEARCHED (Int.Cl.5)						
			G06K G11C H01L						
<p>The present search report has been drawn up for all claims</p> <table border="1"> <tr> <td>Place of search</td> <td>Date of completion of the search</td> <td>Examiner</td> </tr> <tr> <td>THE HAGUE</td> <td>10 June 1994</td> <td>Zeisler, P</td> </tr> </table> <p>CATEGORY OF CITED DOCUMENTS</p> <p>X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document</p> <p>T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons A : member of the same patent family, corresponding document</p>				Place of search	Date of completion of the search	Examiner	THE HAGUE	10 June 1994	Zeisler, P
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